

NEW PERSPECTIVE FOR EVALUATION OF TOOTH WIDTHS IN PATIENTS WITH MISSING OR PEG-SHAPED MAXILLARY LATERAL INCISORS: QUADRANT ANALYSIS

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ABSTRACT

Objective: To compare the mesiodistal widths of teeth having missing lateral or peg lateral with the control side and control set of dentition.

Materials and Methods: This cross sectional study was carried out at Khyber college of dentistry from January 2019 to April 2019. 60 individuals were selected 24 males and 36 females were selected. The mesiodistal width of teeth in quardarants having missing lateral incisors or having peg shape lateral were included and compared with the control set of dentition, consecutive sampling technique was used using SPSS version 22.

Results: maxillary central incisor shows statistically non-significant difference in the mesiodistal width as compared with the control groups of having mesiodistal width of 8.5mm. canine shows statistically significant difference in mesiodistal width when compare with the control groups of having mesiodistal width of 7.5mm. premolars and molars also shows statistically significant difference in mesiodistal widths when compared with the control groups of having mesiodistal width 7mm and 10mm, respectively.

Conclusion: in Patients having missing or peg shape lateral incisor the mesiodistal width of the dentition is narrower than the control subjects so in quadarant analysis will be more helpful in determining treatment stratagies as compared to the conventional tooth analysis method.

Keywords: Quadarant analysis, missing lateral incisor, peg shape lateral incisor.

INTRODUCTION

One of the most common reason for seeking orthodontic treatment is to enhance esthetics. Anterior teeth basically forms the smile zone and patients are extremely concerned about there anterior teeth. Common problems associated with anterior teeth are crowding, spacing, size and shape anomalies, missing lateral incisors and impacted canines¹ missing teeth , the term usually coined as dental agenesis. Dental agenesis is a condition in which the tooth

is not formed at all and it has three common types, Anodontia complete absence of permanent dentition. Oligodontia in which absence of six or more teeth except third molars. And Hypodontia is the term coined to describe 1 to 5 teeth missing in full set of dentition excluding third molars. Missing teeth leads to loss of arch form, migration and tilting of adjusent teeth, spaces, hence, create esthetical and functional problems in oral cavity. Accurate etiology of dental agenesis is not yet known but genetics seems to play a major role. MSX1, PAX9 and AXIN 2 genes are basically involved⁽²⁾ Other than genetic factors environmental factors are also involved about 36.5%.³ Tooth agenesis can result in any stage of development⁴. Complete agenesis or anodontia is

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very rare, agenesis of one or two teeth is common, agenesis of third molars are most common after that lower second premolars are commonly missing, missing upper lateral incisors ranked third and upper second premolar are last but not the least teeth facing agenesis. Agenesis of upper and lower first permanent molars, upper central incisors and lower canines is very rare. Lysell and Grahen noticed generalized tooth reduction in number size and sequence of teeth with multiple tooth agenesis^{3,4}. Prevalence of agenesis of maxillary lateral incisors is 1.6% and prevalence of peg lateral is 4.9% while one another study evaluated prevalence of peg lateral to be 1.8% which means 1 in 55 people worldwide. tooth agenesis is often associated with other anomalies such as microdontia, ectopic eruption, delayed eruption. Study performed by Daniela Gamba et al shows that individuals with tooth agenesis have 38.8% prevalence of microdontia of upper lateral incisor, 3.9% disto rotation of lower second premolar which was not found to be associated with mesiorotation in case of supernumerary⁴. Maxillary lateral incisors excluding third molars have the most morphologic variations.

Treatment modalities of missing lateral incisor are still under furious debates to either close the space of lateral incisor by either canine repositioning or opening or maintaining the space and substitution by implant, in case of peg lateral shape alteration can be done either by composite restorations or veneers.⁵

Particularly in patients with a unilateral missing lateral incisor, quadrant analysis may determine the ideal space for a restoration more precisely than the traditional tooth-size analysis methods. In any of the above treatment modality Golden proportion and Bolton's analysis are given special consideration. This study will help us in future to design a new specified design of cast analysis required in case of missing lateral incisor or peg laterals. The objective of the study was to calculate mesiodistal widths of teeth from central incisor to first molar in quadrants having missing lateral or peg lateral and compare it with the control set of dentition.

MATERIALS AND METHODS

The cross-sectional study was conducted from January 2019 to April 2019 at Khyber college dentistry. Convenient sampling technique was used. The Ethical approval certificate for this cross-sectional

study was taken from the ethical committee of Khyber college of dentistry. Patients were included having all permanent teeth present with one or both sides missing lateral incisor or on one or both sides peg shaped lateral incisor and no other tooth missing other than lateral incisors, good quality dental casts, no impacted tooth other than third molar and no agenesis of any tooth other than third molar. Any tooth having restorations or caries from central incisor to first molar and those with any syndromic conditions affecting head and neck region were excluded from the study i.e cleft lip and palate. A control group was constituted from patients with Angle Class I malocclusion with mild crowding (>3 mm); overjet and overbite within normal limits; permanent dentition with no signs of extreme wear, breakdown, or interproximal reduction in any teeth due to restorations; and normal anterior and overall Bolton ratio. The pretreatment casts of patients with bilateral or unilateral missing maxillary lateral incisors or bilateral peg-shaped maxillary lateral incisors were measured first. The mesiodistal widths of all permanent teeth except the second and third molars were measured, and the sums of total and quadrant tooth widths were calculated. By using WHO sample size calculator, the total calculated sample size was 60, 40% males and 60% females were selected by using 3.9% distorotation of lower second premolar, taking 4% margin of error and 95% confidence interval. Mesiodistal width of each tooth from central incisor to first molar were measured by vernier caliper excluding the lateral incisor (which is already missing or peg shaped, so already malformed and is point of interest, from which rest of dentition is to be evaluated) and mean is calculated and compared with the standard values of the individual by applying T-test using SPSS version 22.

RESULTS

60 patients in which 30 patients with missing lateral incisors and 30 patients with peg shaped lateral incisors were evaluated. The results of maxillary central incisor both right and left side showed mean difference of 0.6333 when compared with standard width of 8.5mm in the mesiodistal width when the sample was compared with the control group. Canine on both sides right and left sides when compared with the control group shows statistically significant difference in the mesiodistal widths when compared with the recommended value of 7.5. First premolar on both sides shows statistically non-significant results

whereas second premolar shows statistically significant difference in the mesiodistal width. Molars on both sides also shows statistically significant difference in the mesiodistal widths when compared with recommended value of 10.35.

Statistical Analysis

40% males and 60% females were included in the study. Males having more percentage of missing lateral incisors while females have more peg shape

laterals.

Minimum and maximum widths of teeth are shown in the above table with their standard deviation values. Mean values of individual teeth were calculated and compared with standard value. One way sample T-test was applied.

Individual tooth measurement showed that mesiodistal width of maxillary right central incisor when compared with recommended mesiodistal width is

Descriptive statistics of participants

	Frequency	Percent
Missing	30	50
Peg shaped lateral	30	50
Male	24	40
Female	36	60

Total N=60	Mean	Std.deviation	Minimum	maximum
Mesiodistal width of upper right Quardarent central incisor	8.5633	.72157	6.00	10.10
Mesiodistal width of upper right Quardarent canine	7.7583	.59583	5.00	9.00
Mesiodistal width of upper right Quardarent ist premolar				
Mesiodistal width of upper right Quardarent ist molar	7.0817	.65600	5.50	8.50
Mesiodistal width of upper left Quardarent central incisor	9.6950	.83796	6.00	10.90
Mesiodistal width of upper left Quardarent canine	8.5350	.74443	6.00	10.50
Mesiodistal width of upper left Quardarent ist premolar	7.7967	.72579	5.00	9.00
Mesiodistal width of upper left Quardarent ist molar	6.9483	.59475	5.50	8.50
_Mesiodistal width of upper right Quardarent 2nd premolar	9.8483	.57534	8.50	11.00
Mesiodistal width of upper left Quardarent 2nd premolar	6.9350	.49739	5.90	8.00
Valid N (listwise)	6.7833	.55637	5.90	8.50

	One Sample T-Test Test Value	Sig. (2 tailed)	Mean Difference	95% Confidence interval of the difference	
				Lower	Upper
Mesiodistal width of upper right central incisor	8.5	.499	.06333	-.1231	.2497
Mesiodistal width of upper left central incisor	8.5	.717	.03500	-.1573	.2273
Mesiodistal width of upper right canine	7.5	.001	.25833	.1044	.4123
Mesiodistal width of left canine	7.5	.002	.29667	.1092	.4842
Mesiodistal width of upper right ist premolar	7.5	.000	-.41833	-.5878	-.2489
Mesiodistal width of upper left ist premolar	7.5	.339	-.08167	-.0878	.2511
Mesiodistal width of upper right second premolar	7	.316	-.06500	-.1935	.0635
Mesiodistal width of upper left second premolar	7	.504	-.05167	-.2053	.1020
Mesiodistal width of upper right ist molar	10.35	.000	-.65500	-.8715	-.4385
Mesiodistal width of upper left ist molar	10.35	.000	-.50167	-.6503	-.3530

8.5mm. The results showed p value <0.04, which is statistically significant. While the left central incisor showed non-significant results.

Mesiodistal width of upper right canine and upper left canine compared with the recommended standard value of 7.5mm. mesiodistal width of upper right and left canine both showed statistically significant results.

Mesiodistal width of right and left upper ist premolar showed non-significant results when compared with the recommended value of 7 .

Second premolar on right side when compared with recommended mesiodistal width of 7 shows non significant results while on left side shows statistically significant results when mesiodistal width of the sample was compared with standard recommended value of 7.

Molar on right and left side when compared their mesiodistal width with recommended value of 10.35 shows statistically significant results on both right and left sides.

DISCUSSION

The objective of our study was to compare the mesio-distal width of the individual teeth from central incisor to ist molar in a quardarant having missing lateral incisor or peg shape lateral incisor and compare these widths with the control side. Statistically significant difference was observed in mesiodistal widths of canine both on right and left side in the effected quardarants. In a study (3) performed in paris 5738 males were undergone diagnostic process and 200 diagnosed with 109 missing lateral incisor either on one side or both and 91 having reduced width of lateral incisor on one side or both were selected through random sample. Control group include 250 individuals. The results of the study showed reduced dimension of the dentition having lacking one or both lateral incisors, after than reduced dimensions were observed with one or both peg laterals as compared to the normal dentition(3). This study also showed that the prevalence of peg laterals is higher in europe and Australia as compared to north America. And also shows that females are 1.37 times more susceptible to dental agenesis as compared to males whereas our study showed that in our population females are more susceptible to malformation whereas males are more susceptible to dental agenesis. The draw back of the

study(3) was only males were included in this study.

Another study (4) , 35 patients after screening of 1894 males and 1940 females were selected through random sampling. The results showed that individuals having peg laterals have higher tendency of contralateral missing lateral incisor (4).

A study performed by Erdal Bozkaya et al which included 8635 patients out of which only 80 patients fulfilled the inclusion criteria, rest were excluded either due to restorations, impacted canine and other reasons. 35 individuals were having bilateral missing lateral incisors, 29

CONCLUSION

Patients with bilateral missing or peg-shaped lateral incisors, individual tooth widths and total tooth widths were smaller than those in the control group. A missing or peg-shaped lateral incisor in the quadrant was a significant factor causing the reduction of the overall mesiodistal tooth widths of that quadrant. Quadrant analysis may determine the ideal space for a restoration more precisely than the traditional tooth-size analysis methods.

Data collection performa

NAME: AGE:

GENDER:

MESIODISTAL WIDTHS OF UPPER RIGHT QUARDA-RANT:

Central incisor	
lateral incisor	
Canine	
First premolar	
Second premolar	
IST molar	

MESIODISTAL WIDTHS OF UPPER LEFT QUARDA-RANT:

Central incisor	
Lateral incisor	
Canine	
IST premolar	
2ND premolar	
Ist molar	

REFERENCES

1. Bozkaya E, Canigur Bavbek N, Ulasan B. New perspective for evaluation of tooth widths in patients with missing or peg-shaped maxillary lateral incisors: Quadrant analysis. *Am J Orthod Dentofacial Orthop*. 2018;154(6):820-8.
2. A meta-analysis of the prevalence of dental agenesis of permanent teeth. Polder BJ et al. *Community Dent O Epi*. 2004; Jun;32(3):217-26
3. Peck S, Peck L, Kataja M. Prevalence of tooth agenesis and peg-shaped maxillary lateral incisor associated with palatally displaced canine (PDC) anomaly. *American journal of orthodontics and dentofacial orthopedics : official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics*. 1996;110(4):441-3.
4. Becker A, Gillis I, Shpack N. The etiology of palatal displacement of maxillary canines. *Clinical orthodontics and research*. 1999;2(2):62-6.
5. Shapira J, Chaushu S, Becker A. Prevalence of Tooth Transposition, Third Molar Agenesis, and Maxillary Canine Impaction in Individuals with Down Syndrome. *The Angle Orthodontist*. 2000;70(4):290-6.
6. Kim JH, Choi NK, Kim SM. A Retrospective Study of Association between Peg-shaped Maxillary Lateral Incisors and Dental Anomalies. *Journal of Clinical Pediatric Dentistry*. 2017;41(2):150-3.
7. Kokich VG1 Maxillary lateral incisor implants: planning with the aid of orthodontics. *J Oral Maxillofac Surg*. 2004 Sep;62(9 Suppl 2):48-56.